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(54) **Method and machine for producing filter-tipped cigarettes**

(57) A method and machine for producing filter-tipped cigarettes, whereby double cigarette portions (14, 15) are fed into respective seats (16b, 16a) on a feed roller (17) and are subsequently cut into single portions (21, 22), which are then joined to each other by means of a band (4) and with the interposition of a dou-

ble filter (27); the double portions (14, 15) are arranged along the periphery of the feed roller (17) in pairs (19a) of adjacent double portions, and the space between each pair (19a) of double portions and each adjacent pair (19a) of double portions is substantially equal to a length of a band (4).

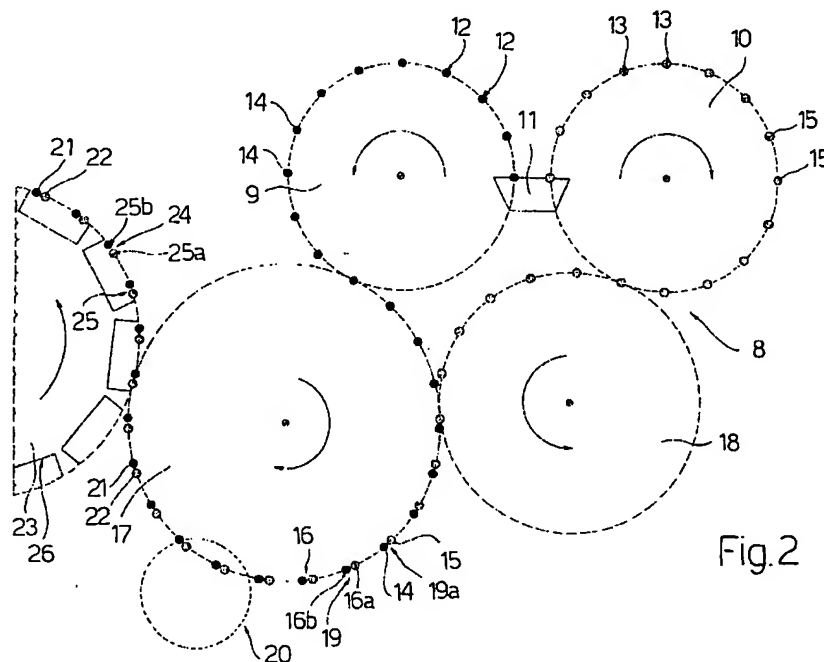


Fig. 2

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## Description

[0001] The present invention relates to a method of producing filter-tipped cigarettes.

[0002] In one known method of producing filter-tipped cigarettes, an output of a cigarette manufacturing machine is connected to an input of a production line of a filter assembly machine; and the input is supplied with a succession of "double" cigarette portions, i.e. portions twice the length of the portion which, joined by a band to a respective filter, forms a normal filter-tipped cigarette.

[0003] On the filter assembly machine and along an input portion of the production line, the double cigarette portions are cut transversely into half to form pairs of single portions, each pair of which is parted axially and separated by inserting a double filter to form, from each double portion, a group defined by two single portions and a double filter. Each group is formed into a so-called "double cigarette" by winding a band about the double filter and part of the single portions as the group is fed along an intermediate rolling portion of the production line.

[0004] Each band is fed to the intermediate rolling portion so that the leading longitudinal edge of the band contacts the respective group, and so that the band initially projects rearwards of the respective group, which must therefore be separated from the following group by a distance at least equal to the width of the band. Each band is normally wound about the respective double filter by rolling each group along a rolling surface, and each double cigarette so formed is fed to an output portion of the production line, along which each double cigarette is cut in half to form two opposed filter-tipped cigarettes, one of which is normally turned over to form a single succession of equioriented filter-tipped cigarettes.

[0005] Of all the above operations, the rolling operation is particularly critical by possibly resulting, if performed over and above a given maximum speed, in tobacco fallout from the open ends of the single portions, and/or in tearing of the paper on the outside of the single portions.

[0006] Since the rotation speed of the single portions during the rolling operation depends directly on the traveling speed of the single portions along the rolling surface, various steps are taken to reduce the speed at which the single portions are fed onto the rolling surface and, hence, the rotation speed of the single portions during the rolling operation.

[0007] One such step, described, for example, in US Patent 5,715,838, provides for feeding the double portions along the input portion of the production line by means of rollers for retaining the double portions inside closely spaced peripheral suction seats - in particular, inside seats equally spaced along the periphery of the rollers with a spacing normally equal to half the width of the double cigarette bands; and the rolling portion is

formed as already known from US Patent 4,745,932, i.e. by means of two parallel, superimposed rolling branches, each of which receives alternate groups from the input portion of the production line, so that the groups fed along each rolling branch are arranged with twice the spacing as along the input portion, and can therefore safely receive the respective bands.

[0008] The provision described in US Patent 5,715,838 involves several drawbacks, foremost of which is the necessity to feed the bands to the respective groups as the groups are fed along the respective rolling branches, and using two distinct feed devices, which must be located on the same side of the production line - in particular, over the production line, for reasons of material supply and the position in height of the production line itself.

[0009] In the case of US Patent 5,715,838, feeding the bands by means of two feed devices located on the same side of the production line necessarily means feeding the material from one of the feed devices across the production line; which is unacceptable.

[0010] It is an object of the present invention to provide a method of producing filter-tipped cigarettes, which is straightforward and cheap to implement and, at the same time, is reliable and designed to eliminate the aforementioned drawback.

[0011] According to the present invention, there is provided a method of producing filter-tipped cigarettes, comprising the steps of feeding double cigarette portions into respective seats on a feed roller of an input portion of a filter-tipped cigarette production line; cutting said double portions transversely, along said input portion, to form pairs of coaxial single portions; axially parting said single portions along said input portion; inserting a double filter between each pair of coaxial single portions along said input portion to form a group of three coaxial elements; feeding a band to each said group by means of two feed devices located on the same side of said production line; and connecting each said double filter to the single portions of the respective group by means of the respective said band along a rolling portion of said production line defined by a first and a second rolling branch located parallel to each other, with said second branch interposed between said first branch and said feed devices; characterized in that said double portions are arranged along the periphery of said feed roller in pairs of adjacent double portions to form, along said input portion, pairs of adjacent said groups; said pairs of adjacent double portions being equally spaced along the periphery of the feed roller so that the space between each pair of adjacent double portions and each adjacent pair of adjacent double portions is substantially equal to a length of a said band.

[0012] The above spacing of the double portions on the feed roller is particularly advantageous by enabling, as in US Patent 5,715,838, the feed roller to accommodate substantially twice the number of double portions which would be permitted by the band assembly oper-

ation. Unlike US Patent 5,715,838, however, the above arrangement in pairs of adjacent double portions enables at least one of the double portions in each pair - in particular, the double portion downstream in the rotation direction of the feed roller - to receive the respective band even before reaching the rolling portion of the production line.

[0013] Consequently, in a preferred embodiment of the above method, for each pair of adjacent groups, a first said band is supplied by a first of said two feed devices to a first group in said pair of groups, as the first group is fed along said input portion; and a second said band is supplied by a second of said two feed devices to a second group in said pair of groups, as the second group is fed along said rolling portion; said first group being located downstream from said second group with respect to a traveling direction of said groups along said production line.

[0014] Preferably, in the method defined above, each said first group is fed along said first branch of the rolling portion of said production line, and each said second group is fed along said second branch of the rolling portion of said production line; each said second band being supplied to the respective said second group as the second group is fed along said second rolling branch.

[0015] The present invention also relates to a machine for producing filter-tipped cigarettes.

[0016] According to the present invention, there is provided a machine for producing filter-tipped cigarettes, the machine comprising a filter-tipped cigarette production line in turn comprising an input portion and a rolling portion; said input portion comprising a feed roller having a number of peripheral seats, supply means for feeding a succession of double portions into said seats, cutting means for cutting said double portions transversely into pairs of coaxial single portions, each said pair of single portions being housed inside a respective said seat, parting means for axially parting the single portions in each said pair of single portions; a supply device for inserting a double filter between the single portions in each said pair of single portions to form a respective group of three coaxial elements; said rolling portion comprising a first and a second rolling branch parallel to each other; two feed devices being provided on the same side of said production line to supply a band to each said group; and said second branch being interposed between said first branch and said feed devices; characterized in that said seats are arranged along the periphery of said feed roller in pairs of adjacent seats to form pairs of adjacent said groups along said input portion; said pairs of adjacent seats being equally spaced along the periphery of the feed roller so that the space between each pair of adjacent seats and each adjacent pair of adjacent seats is such as to substantially receive a said band.

[0017] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view, with parts removed for clarity, of a preferred embodiment of the filter assembly machine according to the invention and connected to a dual-rod cigarette manufacturing machine;

Figure 2 shows a schematic, larger-scale view of a detail in Figure 1;

Figure 3 shows a larger-scale view, with parts removed for clarity, of a further detail in Figure 1.

[0018] Number 1 in Figure 1 indicates as a whole a machine for producing filter-tipped cigarettes.

[0019] Machine 1 comprises a filter-tipped cigarette production line 2 in turn comprising a succession of rollers mounted for rotation about respective axes parallel to one another and perpendicular to the Figure 1 plane, and two identical feed devices 3 - indicated 3a and 3b - for supplying bands 4 and located on the same side of production line 2.

[0020] Production line 2 comprises an input portion 5, a rolling portion 6, and an output portion 7.

[0021] Input portion 5 comprises a supply assembly 8 in turn comprising two counter-rotating rollers 9 and 10 connected - in known manner and as described, for example, in Patent Application EP 682,881 - to an output beam 11 of a known dual-rod cigarette manufacturing machine. Rollers 9 and 10 receive, inside respective suction seats 12 and 13, a succession of double cigarette portions 14 and a succession of double cigarette portions 15 respectively.

[0022] Roller 9 feeds and transfers double cigarette portions 14 into respective suction seats 16 on a feed roller 17 tangent to roller 9 and forming part of input portion 5, while roller 10 transfers double portions 15 onto an intermediate roller 18, which forms part of supply assembly 8, is tangent to feed roller 17 at a point downstream - in the rotation direction of roller 17 - from the point of tangency between rollers 17 and 9, and transfers double portions 15 into respective suction seats 16 on feed roller 17.

[0023] Seats 16 on feed roller 17 are arranged in pairs 19, each comprising two adjacent seats 16 indicated hereinafter 16a and 16b, and of which seat 16a is located behind respective seat 16b in the rotation direction of feed roller 17 and receives a double portion 15, while seat 16b receives a double portion 14. Pairs 19 of seats 16 receive respective pairs 19a of adjacent double portions 14 and 15, and are equally spaced along the periphery of feed roller 17 so that the space between each pair 19 and each adjacent pair 19 - and, hence, between each pair 19a and each adjacent pair 19a - is substantially equal to a length of a band 4.

[0024] As feed roller 17 rotates, the double portions 14 and 15 housed inside each pair 19 of adjacent seats 16 are cut transversely in half, by a known cutting device 20 forming part of input portion 5, to form a pair of coaxial single portions 21 housed inside respective seat 16b, and a pair of coaxial single portions 22 housed inside

respective seat 16a.

[0025] Downstream from cutting device 20, roller 17 is tangent to a known parting roller 23, which forms part of input portion 5 and comprises pairs 24 of seats arranged with the same spacing as the pairs 19 of seats on roller 17. Each pair 24 comprises two adjacent seats 25 indicated hereinafter 25a and 25b, and of which seat 25a receives a pair of single portions 22, and seat 25b a pair of single portions 21.

[0026] Parting roller 23 comprises known movable assemblies 26, which, as parting roller 23 rotates, part the single portions in each pair of single portions 21 and 22 axially by a distance approximately equal to but no less than the length of a double filter 27, which, once inserted, as described later on, between the single portions in a pair of single portions 21 (22), defines a respective group 28 (29) of three elements 21,27,21 (22,27,22).

[0027] The pairs of single portions 21 and 22 are transferred by roller 23 into pairs 30 of seats arranged along the periphery of a further roller 31 with the same spacing as the pairs 19 of seats on roller 17. Each pair 30 comprises two adjacent seats 32, each of which receives a double filter 27 from a known supply device 33 before receiving the two respective single portions 21 or 22. In addition to respective double filter 27, a first of seats 32, indicated 32a, receives a pair of single portions 22 to form a respective group 29; and, in addition to respective double filter 27, a second of seats 32, indicated 32b and located in front of respective seat 32a in the rotation direction of roller 31, receives a pair of single portions 21 to form a respective group 28. Together with respective adjacent group 29, each group 28 forms a pair 34 of adjacent groups.

[0028] The pairs 34 of groups are transferred onto a roller 35, which defines the output roller of input portion 5 and comprises pairs 36 of suction seats arranged along the periphery of roller 35 with the same spacing as pairs 19. Roller 35 is tangent to band feed device 3a and to two rolling branches 37 and 38 parallel to each other and defining rolling portion 6.

[0029] Rolling branch 37 comprises an initial roller 39 having equally spaced suction seats 40 and tangent to roller 35 and to an intermediate roller 41, which has suction seats 42 also equally spaced with the same spacing as seats 40 and seats 16a. Roller 41 is tangent to band feed device 3b and to a roller 43 having equally spaced suction seats 44 with the same spacing as seats 16a. Roller 43 is located with a portion of its periphery facing a fixed rolling plate 45, and is connected to a retiming roller 46 substantially tangent to roller 44 downstream from plate 45.

[0030] Rolling branch 38 comprises a roller 47, which has peripheral seats 48 arranged with the same spacing as seats 16a, is identical to roller 43, is located with a portion of its periphery facing a fixed rolling plate 49, and is connected to a retiming roller 50 substantially tangent to roller 47 downstream from plate 49.

[0031] Rollers 46 and 50 are tangent to a roller 51,

which defines an input roller of output portion 7 and has suction seats 52 equally spaced along the periphery of roller 51 with a spacing substantially equal to half the spacing of seats 16a.

[0032] In actual use, the rear group 29 in each pair 36 of groups fed forward on roller 35 is supplied with a band 4 by band feed device 3a; and, once provided with respective band 4, each group 29 is transferred from roller 35 into a respective seat 48 on roller 47 of rolling branch 38, and is then fed along rolling branch 38 and converted in known manner into a respective double cigarette 53. Double cigarettes 53 are then transferred successively by retiming roller 50 into alternate seats 52 on input roller 51 of output portion 7. The way in which groups 29 are rolled along rolling plate 49 and the functions performed by retiming roller 50 are known and therefore not described for the sake of simplicity.

[0033] The front groups 28 with no bands 4 are transferred from roller 35 to roller 39 of rolling branch 37 and from there to intermediate roller 41. As they are fed forward by roller 41, groups 28 each receive a respective band 4 from band feed device 3b, are formed into respective double cigarettes 54 along the final portion of rolling branch 37, and are transferred by retiming roller 46 into alternate seats 52 on input roller 51 of output portion 7. The way in which groups 28 are rolled along rolling plate 45 and the functions performed by retiming roller 46 are known and therefore not described for the sake of simplicity.

[0034] Double cigarettes 53 and 54 are then transferred from roller 51 to further known processing stations (not shown) located along output portion 7, e.g. to a station where double cigarettes 53 and 54 are cut transversely in half to form respective filter-tipped cigarettes (not shown).

[0035] In a variation not shown, machine 1 is connected to the output beam of a single-rod cigarette manufacturing machine. In which case, supply assembly 8 of machine 1 is replaced, for example, by a supply assembly in which the two rollers 9 and 10 are substantially tangent to each other, have respective projecting seats of the same type as on roller 39 and offset with respect to each other, or are replaced by two rollers having projecting seats, i.e. as on roller 39, and each of which receives alternate double portions of the single rod coming off the manufacturing machine.

## Claims

1. A method of producing filter-tipped cigarettes, comprising the steps of feeding double cigarette portions (14, 15) into respective seats (16b, 16a) on a feed roller (17) of an input portion (5) of a filter-tipped cigarette production line (2); cutting said double portions (14, 15) transversely, along said input portion (5), to form pairs of coaxial single portions (21, 22); axially parting said single portions

(21, 22) along said input portion (5); inserting a double filter (27) between each pair of coaxial single portions (21, 22) along said input portion (5) to form a group (28, 29) of three coaxial elements (21, 27, 21; 22, 27, 22); feeding a band (4) to each said group (28, 29) by means of two feed devices (3a, 3b) located on the same side of said production line (2); and connecting each said double filter (27) to the single portions (22, 21) of the respective group (29, 28) by means of the respective said band (4) along a rolling portion (6) of said production line (2) defined by a first (38) and a second (37) rolling branch located parallel to each other, with said second branch (37) interposed between said first branch (38) and said feed devices (3a, 3b); characterized in that said double portions (14, 15) are arranged along the periphery of said feed roller (17) in pairs (19a) of adjacent double portions (14, 15) to form, along said input portion (5), pairs (34) of adjacent said groups (28, 29); said pairs (19a) of adjacent double portions (14, 15) being equally spaced along the periphery of the feed roller (17) so that the space between each pair (19a) of adjacent double portions (14, 15) and each adjacent pair (19a) of adjacent double portions (14, 15) is substantially equal to a length of a said band (4).

2. A method as claimed in Claim 1, characterized in that, for each pair (34) of adjacent groups (28, 29), a first said band (4) is supplied by a first (3a) of said two feed devices (3a, 3b) to a first group (29) in said pair (34) of groups as the first group (29) is fed along said input portion (5); while a second said band (4) is supplied by a second (3b) of said two feed devices (3a, 3b) to a second group (28) in said pair (34) of groups as the second group (28) is fed along said rolling portion (6); said first group (29) being located downstream from said second group (28) with respect to a traveling direction of said groups (28, 29) along said production line (2).
3. A method as claimed in Claim 2, characterized in that each said first group (29) is fed along said first branch (38) of the rolling portion (6) of said production line (2), while each said second group (28) is fed along said second branch (37) of the rolling portion (6) of said production line (2); each said second band (4) being supplied to the respective said second group (28) as the second group (28) is fed along said second rolling branch (37).
4. A method as claimed in any one of Claims 1 to 3, characterized in that said pairs (19a) of adjacent double portions (14, 15) are formed by feeding to different peripheral points of said feed roller (17) a first succession of equally spaced first double portions (14), and a second succession of equally spaced second double portions (15).

5. A machine for producing filter-tipped cigarettes, the machine comprising a filter-tipped cigarette production line (2) in turn comprising an input portion (5) and a rolling portion (6); said input portion (5) comprising a feed roller (17) having a number of peripheral seats (16), supply means (8) for feeding a succession of double portions (14, 15) into said seats (16), cutting means (20) for cutting said double portions (14, 15) transversely into pairs of coaxial single portions (21, 22), each said pair of single portions (21, 22) being housed inside a respective said seat (16), parting means (23) for axially parting the single portions (21, 22) in each said pair of single portions (21, 22); a supply device (33) for inserting a double filter (27) between the single portions (21, 22) in each said pair of single portions (21, 22) to form a respective group (28, 29) of three coaxial elements (21, 27, 21; 22, 27, 22); said rolling portion (6) comprising a first (38) and a second (37) rolling branch parallel to each other; two feed devices (3a, 3b) being provided on the same side of said production line (2) to supply a band (4) to each said group (28, 29); and said second branch (37) being interposed between said first branch (38) and said feed devices (3a, 3b); characterized in that said seats (16) are arranged along the periphery of said feed roller (17) in pairs (19) of adjacent seats (16) to form pairs (34) of adjacent said groups (28, 29) along said input portion; said pairs (19) of adjacent seats (16) being equally spaced along the periphery of the feed roller (17) so that the space between each pair (19) of adjacent seats (16) and each adjacent pair (19) of adjacent seats (16) is such as to substantially receive a said band (4).
6. A machine as claimed in Claim 5, characterized in that a first of said two feed devices (3a, 3b) is located along said input portion (5) and supplies a first said band (4) to a first group (29) in said pair (34) of adjacent groups (28, 29); while a second (3b) of said two feed devices (3a, 3b) is located along said rolling portion (6) and supplies a second said band (4) to a second group (28) in said pair (34) of groups as the second group (28) is fed along said rolling portion (6); said first group (29) being located downstream from said second group (28) with respect to a traveling direction of the groups (28, 29) along said production line (2).
7. A machine as claimed in Claim 6, characterized in that said second feed device (3b) is located along said second branch (37) of the rolling portion (6).
8. A machine as claimed in Claim 6 or 7, characterized in that said second rolling branch (37) comprises at least one roller (39, 41, 43, 46) having a number of equally spaced peripheral seats (40, 42, 44), each for receiving a respective said second group (28).

9. A machine as claimed in Claim 6, 7 or 8, characterized in that said first rolling branch (38) comprises at least one roller (47, 50) having a number of equally spaced peripheral seats (48), each for receiving a respective said first group (29). 5
10. A machine as claimed in any one of Claims 5 to 9, characterized in that said supply means (8) comprise a first roller (9) for feeding a succession of first double portions (14) into respective first seats (16b) 10 in said pairs (19) of adjacent seats (16); and a second roller (10) for feeding, via the interposition of a third roller (18), a succession of second double cigarette portions (15) into respective second seats (16a) in said pairs (19) of adjacent seats (16). 15

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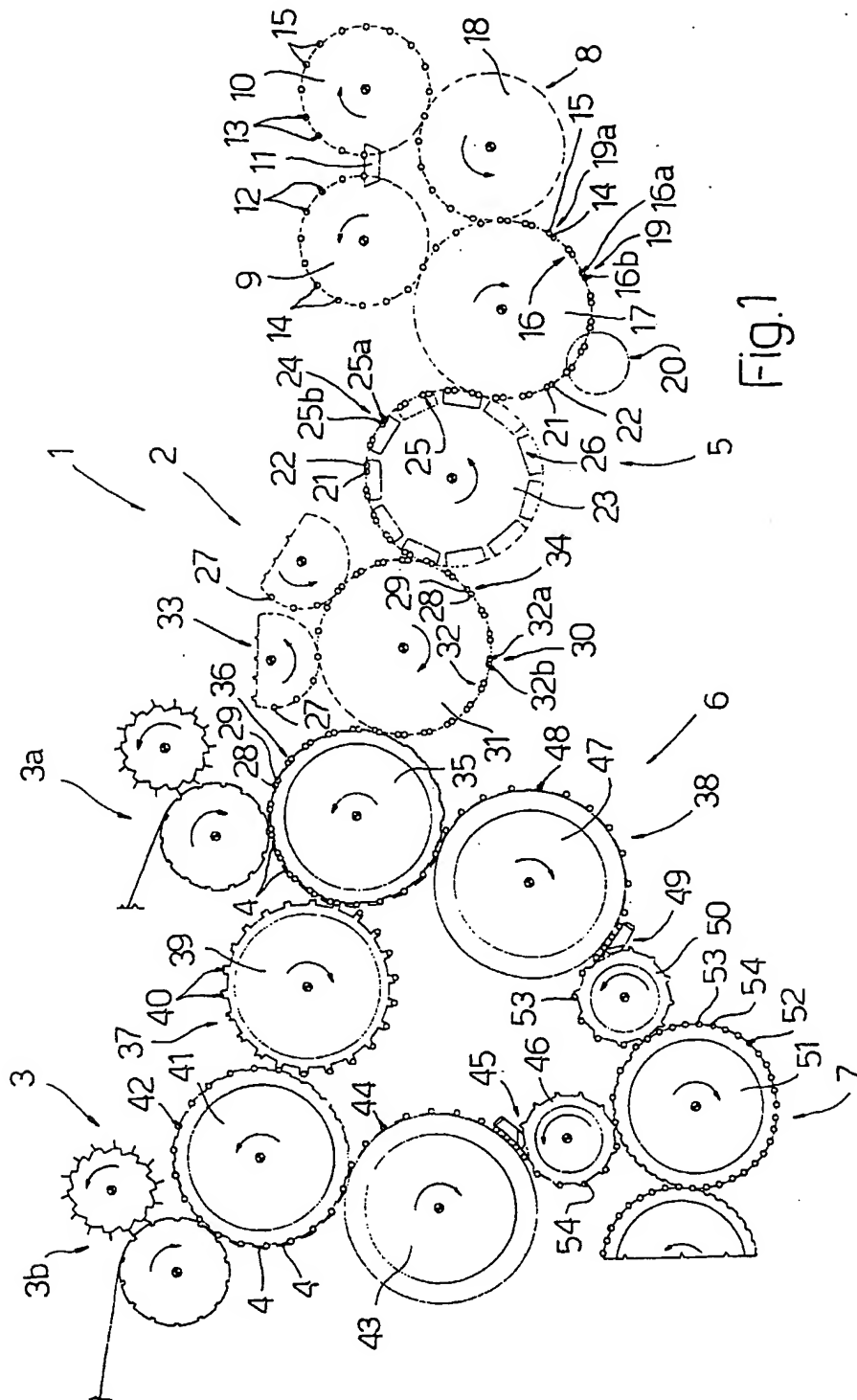


Fig. 1

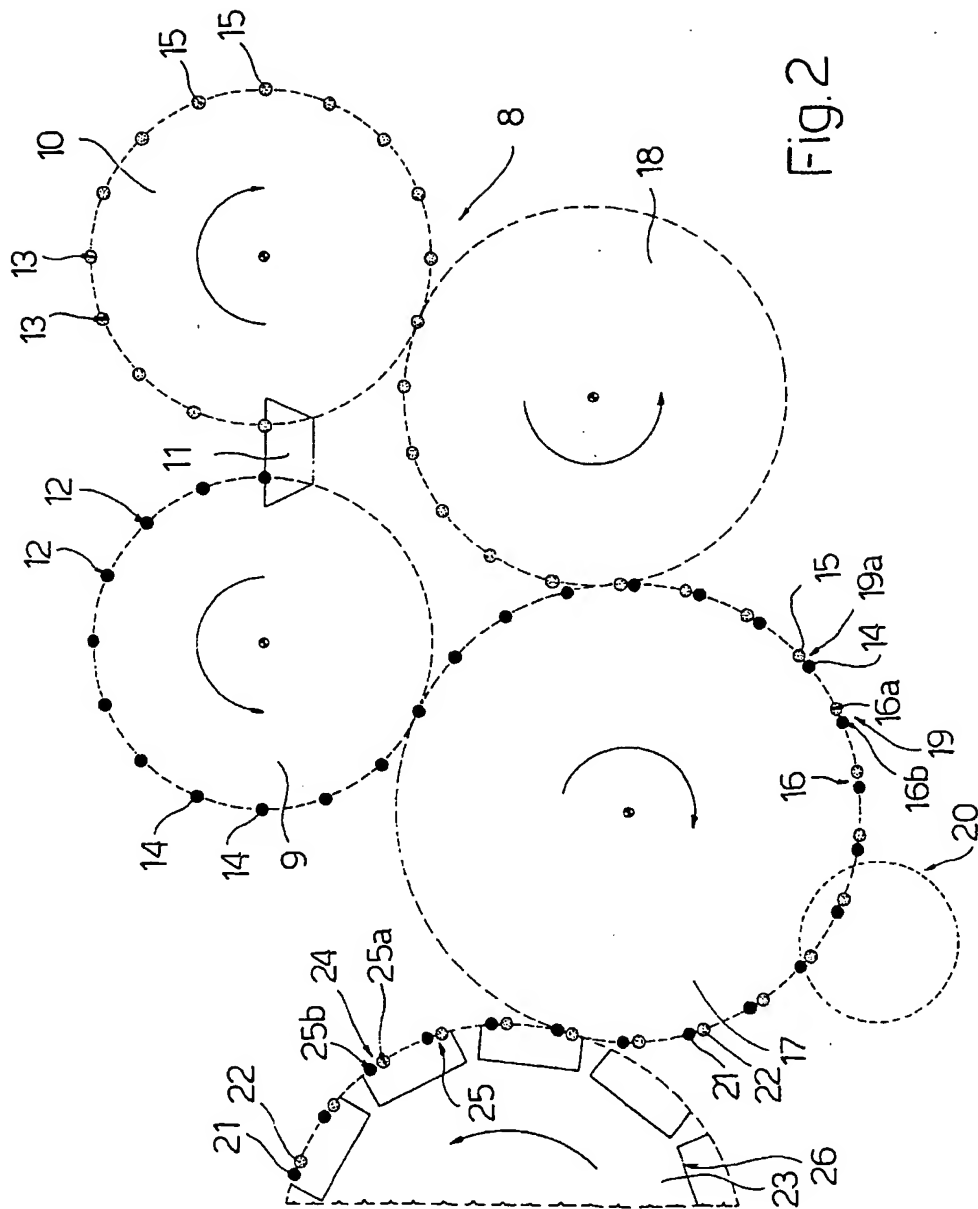
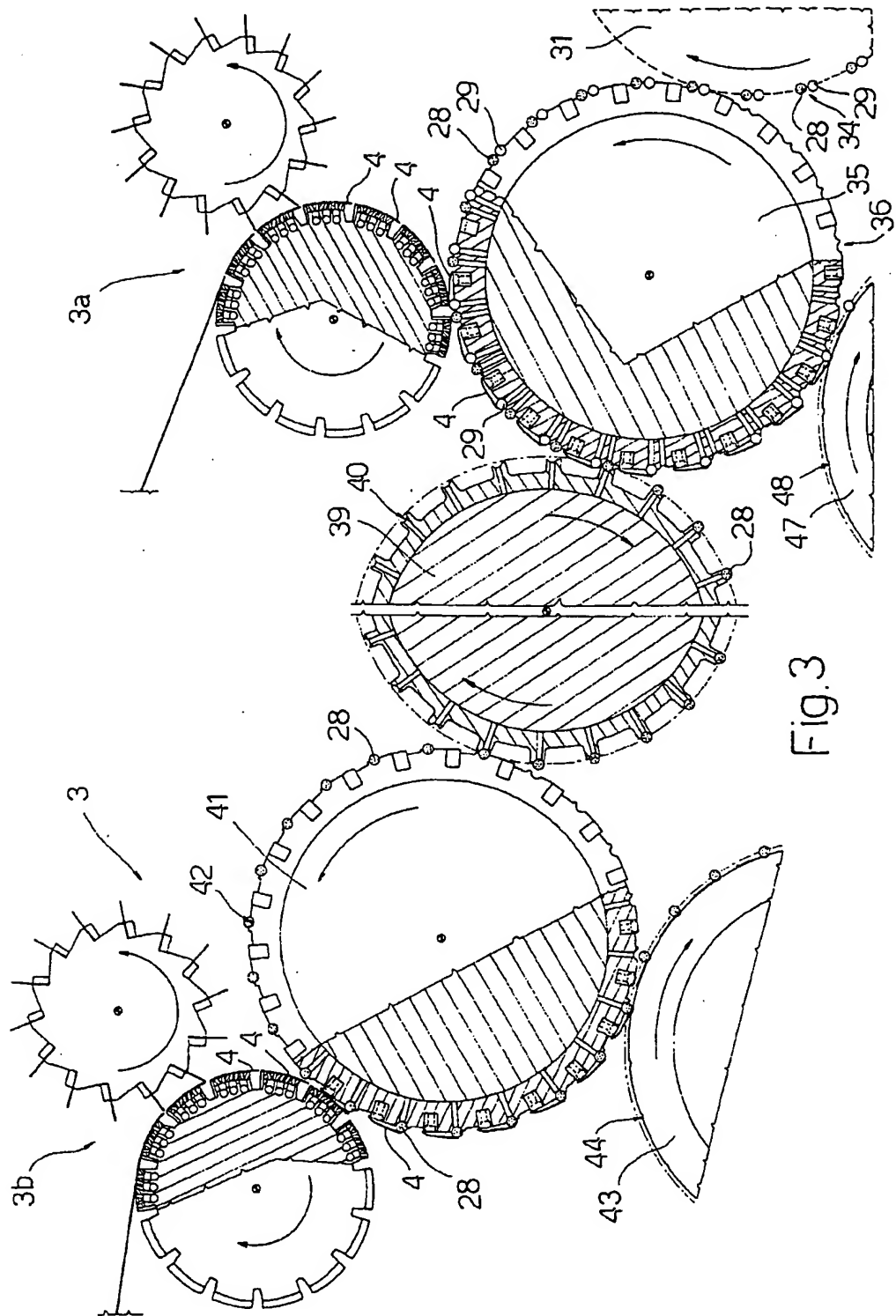


Fig. 2







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